CLAIMS

What is claimed is:

1. A method for polling and scheduling in a multiuser network that includes a plurality of bandwidth efficient modems, with at least one modem designated as a polling point coordinator access point (AP) element, the method comprising:

indicating the beginning of a contention-free period;

simultaneously transmitting on a single channel a first set of polling signals, where each polling signal corresponds to a particular terminal included in a first set of terminals included in the network;

receiving two or more simultaneous responses from the first set of polled terminals;

recovering each of those two or more simultaneous responses using co-channel demodulation capabilities of the AP element; and

transmitting clear-to-send messages to any terminals requesting to send data, as indicated by received responses.

2. The method of claim 1 wherein the recovering is followed by:

simultaneously transmitting acknowledgement signals to responding terminals.

3. The method of claim 1 wherein the recovering is followed by:

simultaneously transmitting a next set of polling signals to a next set of two or more terminals;

receiving two or more simultaneous responses from the next set of polled terminals; and

recovering each of those two or more simultaneous responses using co-channel demodulation capabilities of the AP element.

4. The method of claim 3 further comprising:

repeating the steps of simultaneously transmitting a next set, receiving two or more simultaneous responses from the next set of polled terminals, and recovering each of those two or more simultaneous responses using co-

channel demodulation capabilities of the AP element until the end of the contention free period.

5. The method of claim 3 wherein simultaneously transmitting a next set of polling signals is preceded by simultaneously transmitting acknowledgement signals to responding terminals.

6. The method of claim 1 wherein indicating the beginning of a contention-free period includes transmitting a beacon signal.

7. The method of claim 1 wherein the polling signals are generated by the AP element using an optimal phase relationship to facilitate signal recovery.

8. The method of claim 1 wherein the responses include at least one of an acknowledgement signal and a request-to-send signal.

9. The method of claim 1 wherein transmitting clear-to-send messages to any terminals requesting to send data enables those terminals to simultaneously transmit messages to other terminals in the network after a guard interval.

10. The method of claim 1 further comprising:

transmitting a message to signal the end of the contention free period.

11. The method of claim 1 further comprising:

monitoring the channel;

transmitting clear-to-send messages to queued terminals when currently transmitting terminals complete data transmission; and

in response to no terminals being queued, simultaneously transmitting on a single channel a next set of polling signals.

12. A method for polling and scheduling in a multiuser network that includes a plurality of bandwidth efficient modems configured to carry out a distributed coordination function (DCF) for providing best-effort delivery of asynchronous packet data, the method comprising:

two or more terminals simultaneously transmitting on a single channel requests-to-send (RTS) messages to a first set of destination modems;

simultaneously receiving clear-to-send (CTS) messages from the first set of destination modems at each of the requesting-to-send modems;

recovering each corresponding CTS message using co-channel demodulation capabilities of the corresponding requesting modem;

each requesting modem simultaneously transmitting its respective data on to the network; and

each corresponding destination modem recovering the corresponding data using its co-channel demodulation capabilities.

13. The method of claim 12 further comprising the preliminary steps:

each modem detecting that one or more of the other modems included in the network are bandwidth efficient and therefore capable of an aggressive access protocol that exploits co-channel demodulation capabilities; and

switching from a legacy protocol mode to the bandwidth efficient aggressive access protocol mode for at least one pair of communicating modems included in the network.

14. The method of claim 12 comprising:

each modem adaptively learning modes of operation which each particular modem in the network is capable; and

storing the learned modes operation.

15. The method of claim 14 wherein the learned modes of operation include a legacy protocol mode and a bandwidth efficient aggressive access protocol mode that exploits co-channel demodulation capabilities.

16. The method of claim 12 further comprising:

repeating the steps of simultaneously transmitting requests-to-send (RTS) messages, simultaneously receiving clear-to-send (CTS) messages, recovering each corresponding CTS message, simultaneously transmitting

respective data on to the network, and recovering the corresponding data for one or more next sets of destination modems.

17. A modem which enables efficient use of bandwidth in a multiuser wireless network including a plurality of modems in the presence of interference and noise, the modem comprising:

a multiuser detection module adapted to simultaneously demodulate and recover K wirelessly transmitted signals using co-channel demodulation;

a data formatting module operatively coupled to the multiuser detection module, and adapted to produce network data packets for at least one of the K recovered signals;

a control processor operatively coupled to the formatting module, and adapted to detect with which protocol mode the at least one of the K recovered signals was transmitted, and to enable a corresponding transmission mode including one of a legacy protocol mode and a bandwidth efficient aggressive access protocol mode that exploits co-channel demodulation capabilities of the modem; and

a demultiplexer operatively coupled to the data formatting module and the control processor, and adapted to select one of the recovered K wirelessly transmitted signals as a target signal intended for a user associated with the modem, where the selection is based on a control input from the control processor.

18. The modem of claim 17 further comprising:

a front end adapted to simultaneously receive the K wirelessly transmitted signals, and to provide those signals in a form that facilitates their subsequent processing by the multiuser detection module.

19. The modem of claim 17 wherein the data formatting module supports multiple types of format modes, and the control processor is configured to select a formatting mode in which the data formatting module operates.

20. The modem of claim 17 wherein in response to the control processor knowing that a modem with which it is communicating does not support the bandwidth efficient aggressive access protocol mode, the control processor is further adapted to enable a legacy protocol mode there by providing backwards compatibility.

21. A method for polling and scheduling in a multiuser network that includes three or more bandwidth efficient modems, with at least one modem designated as a polling point coordinator access point (AP) element that operates as a global timer, the method comprising:

receiving a beacon signal from the AP element that indicates frame start, the frame having an interval;

monitoring current broadcasting activity of other modems included in the network so as to identify an open slot available for data transmission in a channel, where two or more modems can transmit in the channel at the same time; and

in response to identifying an open slot and being next in a transmission queue, transmitting data in the open slot.

22. The modem of claim 21 wherein the transmission queue is based on a round robin scheme, where each modem included in the network is assigned a transmission priority.

23. The modem of claim 21 wherein the transmission queue is based on priority information included in the beacon signal.

24. The modem of claim 21 wherein the monitoring and transmission steps are repeated until a global signal to end the frame is received from the AP element.